FARMERS' BULLETIN 1023
United States Department of Agriculture

Machinery for cutting firewood

POWER MACHINERY for cutting firewood offers a practical solution of the fuel problem on farms where wood is available. A day's work with a buzz saw or a drag saw will yield as much firewood as could be cut in many days' hard work by hand and will effect a saving of labor, or coal, or perhaps of both, that is well worth considering at a time when both are scarce and high priced.

The shortage of coal in many localities has been due as much to shortage of cars to haul it as to scarcity of coal. The more wood is burned the less coal will need to be transported and the more cars will be released for other needed service. He who burns wood instead of coal helps in the general transportation situation.

This bulletin describes the different types of wood-sawing rigs, points out the advantages and disadvantages of each, gives information as to first cost and cost of operation, and offers suggestions as to how they may be operated most efficiently.

OFFICE OF THE SECRETARY

Contribution from the Office of Farm Management

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MACHINERY FOR CUTTING FIREWOOD.

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CONTENTS.

WOOD FOR FUEL.

THE LARGE AMOUNT OF LABOR required in preparing firewood for the stove heretofore has kept many farmers from using wood for fuel, even though there was plenty of wood on the farm which would be almost if not entirely wasted if not used for this purpose. (See fig. 1.) Now, when the National coal supply is low

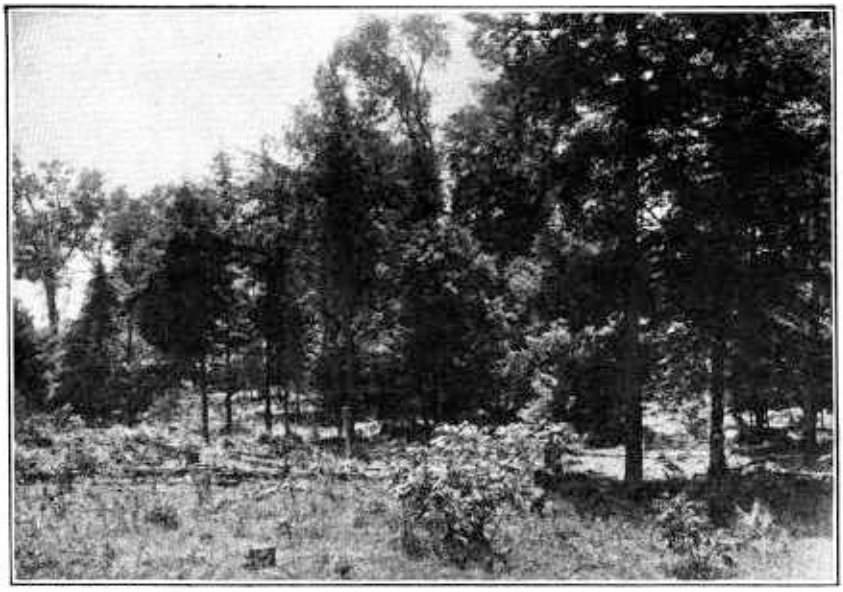

FIG. 1.—In many cases enough fallen timber will be found in the farm woodlot to supply the family with fuel for several seasons.

and prices high, farmers who can supply their fuel from their own farms will find it considerably more profitable than in normal times. A still greater consideration is that it is also a patriotic thing to do.

The use of power machinery will reduce the labor requirements to the point where the farmer should be able to get his wood ready to burn without seriously neglecting other work. (See fig. 2.) A great

NOTE.—Thanks are due to Mr. E. R. Hodson, of the Forest Service, U. S. Department of Agriculture, for suggestions followed in the preparation of this bulletin.

many farmers already have gasoline engines suitable for furnishing the power for wood-sawing machines. These machines are comparatively inexpensive, and the labor one saves will be sufficient to pay for it long before it is worn out. One outfit can do the work for several families each year, and the purchase of a complete outfit, including an engine to furnish power, may be profitable for a group of farmers or for one who has an opportunity to do custom work for his neighbors.

GETTING WOOD READY FOR THE SAW.

When cutting into stove lengths is done with a power-driven saw, cutting down the trees and trimming them ready for the saw takes more time and is harder work than anything else connected with the preparation of firewood. If trees selected for fuel contain any marketable timber, it will usually be advisable to save it and use only the tops and inferior part of the trunks for firewood. The work of preparing a given amount for fuel will be considerably greater in cases like this than if the entire trees are used.

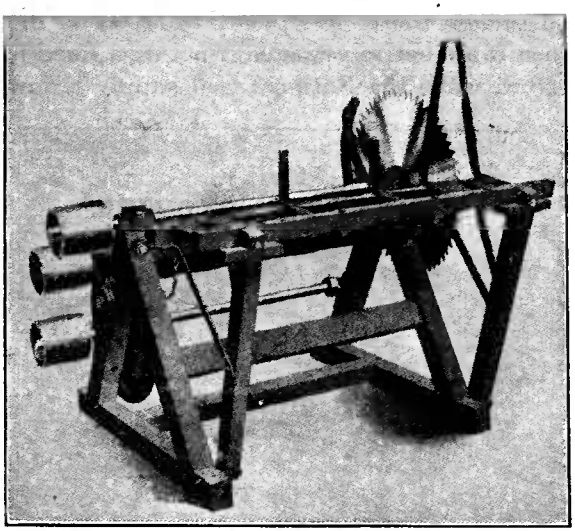

FIG. 2.—A tilting-table wood-sawing machine with the flywheel placed below the table. Such an outfit will handle either cordwood or light poles with equal facility.

If the work is being done on the farm by the regular farm help, it will usually be best to cut the wood into lengths as long as two or three men can handle without loss of time in loading and hauling out of the woods and in getting to the saw. It takes much less time to cut through a log with a power-driven saw than it does by hand, and the longer the logs are cut the less is the total amount of time and labor required to get the wood ready to burn—provided, of course, they are not too heavy to handle without serious loss of time. If a good skidway is built so that the logs and heavy poles can be rolled up on to the table of the buzz saw, or the carrier of the drag saw, as the case may be, longer and heavier pieces can be handled more efficiently than if all must be lifted directly off the ground to the saw.

Where it is possible it will be worth while to set the saw on a slope, so that the logs and poles can be skidded into a pile above it. They can then be rolled to the saw with little effort, and the skids for raising them to the table or carrier of the saw can be approximately horizontal. An arrangement like this might make possible the operation of the sawing outfit with one less man than would be required if the saw were placed on level ground. When the wood can not be dragged or skidded to the saw, the work of loading it will be somewhat less if it is hauled on sleds than if wagons are used.

The wood will be free from dirt and grit when it goes to the saw if it is cut and hauled out over the snow, and the saw blade will not need filing so often and will last somewhat longer if all the wood which it saws is free from dirt and sand. However, if the wood cutting is left until midwinter in the northern part of the country, the snow may become so deep that it will be very difficult to get into the woods at all with a team.

In many localities it is customary, before hauling the wood to the saw, to cut it all into 4-foot lengths and to split any large logs into sticks that can be handled easily by one man. The total amount of work required for getting the wood into stove lengths and sizes will be somewhat greater when this method is followed than when it is left in large logs and long poles, but under some conditions it will probably be more satisfactory. Where the wood is being cut by extra labor, cutting it into 4-foot lengths and cording it up in piles 4 feet high makes it easy to measure accurately for sale and purchase or when the woodcutters are working on a piecework basis. If the wood is to be hauled a long distance before it is cut into stove lengths, it may be better to have it cut into cordwood—as wood in this shape is usually called—in the woods. A greater quantity can be put on a wagon than of logs and poles of irregular lengths. One man can load and unload the cordwood easily, while it would take two or more if it were left in pole lengths. Also, a smaller saw can be used efficiently for cutting the cordwood into stove lengths.

However, if the wood is all on the farm, if it can be taken to the saw at odd times, if the haul is short, and if enough help is available to handle the big logs and long poles, the practice first described is probably the more efficient. The fewer times the logs and poles are cut by hand the less will be the total amount of labor expended on the wood.

When the entire tree is to be used for firewood and the trunk cut into lengths sufficiently short for two men to handle in loading and sawing, and the tops cut into poles and sticks as long as possible, it probably will be a fair day's work for two men to prepare for the saw a supply sufficient to make from four to six cords. If the best parts of the trees are saved out for timber and only the tops and un-

sound parts used for firewood, the labor necessary to get out a given amount will, of course, be considerably greater. If all is made into cordwood and then corded up into orderly piles, the amount of work necessary will be nearly doubled. However, it will not take quite as long to haul the cordwood to the saw and most certainly will not take as long to saw it.

THE CIRCULAR SAW.

Buzz-saw outfits for cutting firewood are built in a variety of sizes and styles. The size and style best suited to a particular place will depend mostly on the character and amount of wood to be cut, the power available for running it, and the number of men to be used on the work. The saw blades are made in sizes from 12 inches or less up to 36 inches in diameter and the frames are of corresponding size and strength. Some of the smaller frames are not provided with flywheels, some have the flywheel mounted directly on the saw mandrel, and some have it mounted on a separate shaft below the saw table. The tables for holding the wood as it is pushed against the saw blades are of two general types, the tilting or swinging table and the rolling or sliding table.

SIZE AND SPEED OF SAW BLADE.

The saw blade provided should be of ample size to cut through at one operation the largest pieces of wood commonly handled. The diameter of the largest stick that can be cut depends somewhat on the way the table is mounted with reference to the saw blade, but it will always be a little less than half the diameter of the blade. Blades of from 24 to 30 inches in diameter are the most popular sizes. A 24-inch blade will cut a stick as much as 9 inches in diameter satisfactorily, and a 30-inch blade should handle logs up to approximately 1 foot thick. Wood so large that the saw will not reach clear through it can be cut by turning the pole or log and cutting through it again, but this will result in a considerable loss of time, for it takes at least twice as long to cut the log in two this way as would be required if the saw were large enough to cut it through at once.

It may be well when purchasing a new saw blade to get one somewhat larger than actually required, for it will keep getting smaller as it is used and the teeth worn and filed away. Aside from the difference in first cost, the large saw blade can be run just as economically as the small one, and it will be possible to use it at any time for wood larger than ordinary without loss of time. This point should be borne in mind, especially by the man who expects to do any large amount of custom work or cutting of wood for sale.

The speed at which the saw blade is run is another important factor. The best speed will vary somewhat for different kinds of

wood, but manufacturers and experienced saw users are of the opinion that variation of more than a few per cent from the standard speed is never desirable. The peripheral speed (the rate at which the saw teeth travel) recommended is between 9,000 and 10,000 feet per minute, which makes about 1,200 revolutions per minute for a 30-inch blade and about 1,500 for a 24-inch blade, with correspondingly smaller or larger number of revolutions per minute for saws of other sizes. The operator should know the speed at which his engine runs and should be sure that the pulley on the saw is of the right size to give the proper speed. Too low speed will make quick, clean cutting impossible and too high speed will require excessive power and at the same time cause needless wear and tear on the saw and frame.

THE SAW TABLE.

Original cost and personal inclination of the operator will probably have something to do with the kind and size of table selected for the sawing outfit, but, generally speaking, the small tilting table is preferable for cutting cordwood or small short pieces and the rolling table for wood of large diameter. The tilting table is usually pivoted to the lower part of the frame and so built that when a cut is finished gravity will pull the table from the saw and into position for moving the wood up for the next cut.

These tilting-table saws are often designed only for cutting cordwood. In such cases the table is built directly in front of the saw mandrel, and the uncut part of the stick goes up between the flywheel and the saw blade. The piece that is cut off then can fall directly to the ground and be out of the way for the next cut. The saw mandrel will usually be less than 4 feet in length; and if the flywheel is mounted on the saw mandrel, poles or other longer pieces of wood can not be put on the table without coming into contact with the flywheel. Tilting-table frames built for cutting pole wood either have the flywheel mounted on another shaft so that it runs below the table (see fig. 2), or have the table placed on the side of the saw blade away from the mandrel, so that the wood is fed to the saw from the outside (see fig. 3).

For the larger poles and logs the rolling or sliding table is usually preferred. (See fig. 4.) A table of this kind will carry the heavy pieces into the saw more evenly than the tilting table and with probably less effort on the part of the men. The rolling table will not come back into position for a new cut as quickly and easily as the tilting table, but the loss of time will not be relatively so great on large logs as on smaller pieces, and the greater ease in handling long heavy pieces will usually more than offset this slight loss in time.

The table should be long enough to carry the longest logs and poles without much effort being expended by the sawyer or his helper. It

will be easier to push these heavy pieces forward on the table if it is provided with a roller at the end. The longest tables sometimes have more than one roller. If the table is not equipped with rollers and the logs are hard to push forward, some pieces of gas pipe one or two inches in diameter and a foot or so long placed under the logs as they come on the table will make the work much easier.

Rolling or sliding table saw frames are nearly all so built that the wood is brought up to the saw on the side opposite the flywheel, and the short piece cut off is left on the table between the blade and flywheel. This must be removed before the log can be advanced for the next cut, and if the man who is doing this work falls behind, time will be lost by the remainder of the crew.

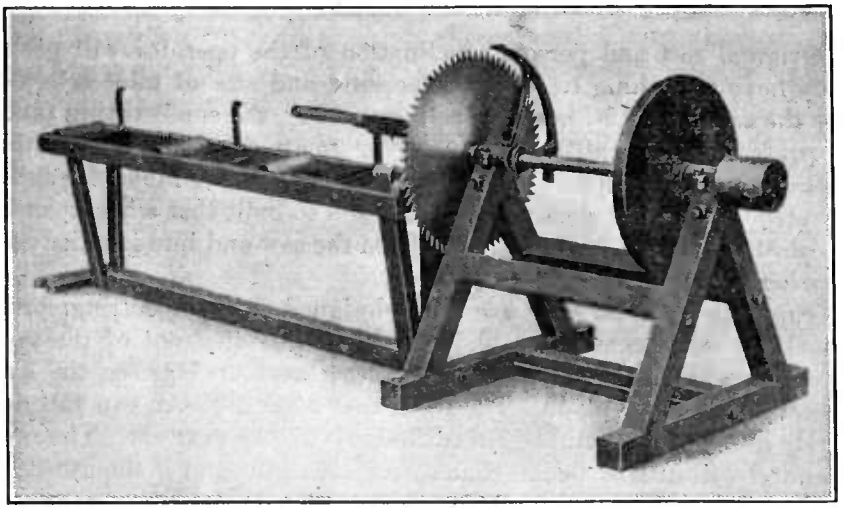

FIG. 3.—A tilting-table saw frame with the table on the side of the blade opposite the flywheel, designed primarily for cutting heavy poles and logs.

DANGER TO OPERATOR.

There is an element of danger which should always be borne in mind when using a circular-saw machine. The saw runs at high speed, and an instant's contact with the blade is sufficient to sever a finger or even the whole hand. Such accidents are not infrequent, but they are nearly always due to the carelessness of the sawyer. Every saw table should have a guard to prevent the hand or arm coming in contact with the blade while moving the wood on the table. Many saws have a guard over the back and upper part of the blade as an additional safety device, but even the best of these will not prevent all the accidents due to carelessness. The careful sawyer will not only have these guards on his saw, but will have the danger connected with the work constantly in mind.

A piece of wood that comes in contact with the saw teeth at any time except when it is on the table in the proper position for cutting will likely be thrown from the saw with sufficient force seriously to injure a man. Saw blades have been known to burst on account of flaws or cracks or being run at too high speed. Anyone in the path of the flying pieces surely will suffer serious injury.

POWER AND FUEL REQUIREMENTS.

A circular-saw outfit can be operated with a wide range of power, and a large majority of the gasoline engines found on farms may be used for this purpose. The actual power required depends on the size and kind of the wood to be sawed, the rate at which it is fed

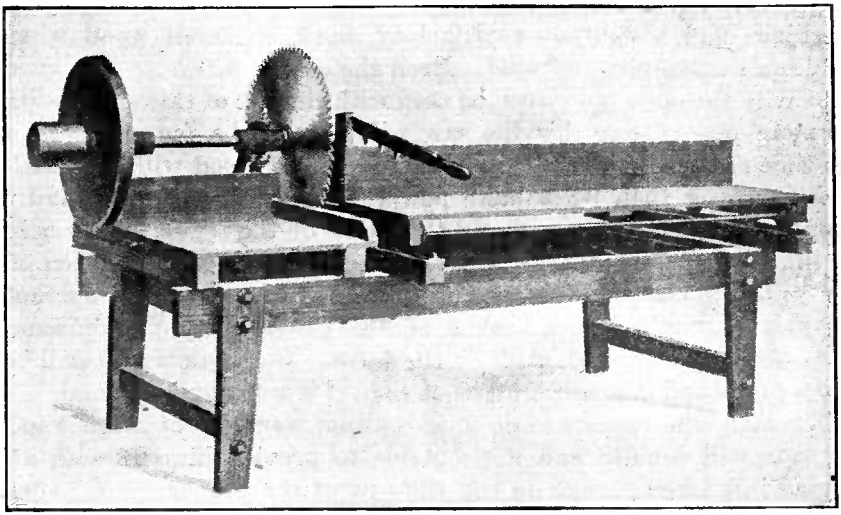

FIG. 4.—A rolling-table saw frame of the type suitable for cutting all kinds of wood from the heaviest logs to light poles. Such a machine is usually preferred when the entire trees are used for firewood and are brought to the saw in as large pieces as can be handled.

to the saw, and to a certain extent on the condition of the saw blade. If a small engine is used it may be necessary to feed the saw slowly and split up some of the larger pieces before they come to the saw. If much of the wood to be cut is thick and heavy, a somewhat larger engine should be provided than where cordwood that has all been split into small pieces or top wood of only a few inches diameter is to be cut exclusively.

Practically all manufacturers recommend not less than a 4-horsepower engine for their saws, and for heavy wood a little larger one of, say, 6 horsepower may be preferable. An engine of this size, when in good order, should be able to cut the largest wood as fast as it can be brought to the saw. A still larger engine can be used, although

the fuel cost usually will be somewhat greater. However, if the governor is adjusted correctly the load will determine to a certain extent the fuel consumption.

Some farmers use for cutting their wood engines up to 12 or 15 horsepower, which have been installed primarily for heavier work, such as cutting ensilage, running a large feed grinder or a small thrashing machine, and consider the practice more economical than the purchase of an engine especially for the wood saw. Even the tractor is sometimes used, and it is probably a good practice if there is no other engine on the farm, and only the family supply of wood is to be cut.

Some small rigs are designed especially for use with engines of only 3 or even 2 horsepower. They do not cost as much as the heavier machines and should do satisfactory work on small wood when only one or two men are used. Even the outfits which are designed primarily for more power can be used with engines of this size. With no more power than this the saw will have to be fed slowly and the time required for cutting a given amount of wood will be considerably greater than when more power is used. If only the family supply of wood is to be cut, and that done by the regular farm help at times when other work is not pressing, a reduction of even 50 per cent in the output of the saw would scarcely be enough to warrant the hire or purchase of a heavier engine, provided the one on hand were suited to the other work on the farm. The work would still be much easier and take much less time than if it were done by hand.

The man who expects to do much custom work or cut much wood for sale will usually find it profitable to provide himself with an engine just large enough to run the saw at the proper speed under the maximum load. If it is necessary to favor the engine to any great extent the loss of time on the part of three or four men who are being paid good wages will soon become a serious matter. On the other hand, there would be no advantage in providing an engine larger than necessary.

The standard fuel consumption of a gasoline engine is from a sixth to an eighth of a gallon per horsepower per hour when working under full load; that is, a pint or a little over. This would make approximately 8 gallons of gasoline necessary for a 6-horsepower engine, running 10 hours under full load. However, experienced saw users estimate the average fuel consumption in sawing wood with engines of approximately this size as not over 5 gallons per 10-hour day. This difference is probably due to the fact that the engine does not run under full load all the time, and the amount of gasoline used is automatically reduced when the engine is running without load or under a light load.

PORTABLE OUTFITS.

Sawing outfits with the engine and the saw mounted on the same truck are manufactured by several firms, and are in favor with men who do custom work or for other reasons often desire to transport the rig from place to place. (See illustration on title-page.) They are built in a variety of styles and sizes and with engines of different sizes, so that one can be found that is suitable for almost any kind of wood cutting. One team can easily draw the whole rig. However, for the individual who cuts only his own wood, or where wood cutting constitutes only a small part of the work which the engine will do, it will usually be preferable to have the engine and saw as two separate units. While it is possible to use the engine on a combined rig for other work, the saw blade and frame will always be more or less in the way and to remove them is too much trouble.

SIZE OF CREW AND RATE OF DOING WORK.

The number of men required for the most efficient operation of a buzz saw, and the amount of wood which they can cut in a given time will depend on the wood, the machine, the power available, and the skill of the men. When the whole trees are being converted into firewood with a saw large enough to cut the largest pieces without loss of time and an engine powerful enough to drive the saw at the proper speed under the heaviest load, at least four men will be required to keep the wood up to the saw as fast as the saw will handle it. With a four-man crew, one man will do the actual sawing, one will help hold the logs and poles on the table and push them forward into position for the successive cuts, one will remove the blocks from the saw as they are cut, and the fourth will keep the logs and poles up to the saw.

A fifth man often can be used to advantage to help get the logs up to the saw and to split or slab some of the larger blocks after they have been sawed. If the saw is placed on a slope below the logs and a skidway and possibly a stationary table built beyond the end of the sawing table, it may be possible to dispense with one man who otherwise would be necessary for helping get heavy logs up to the saw.

The rate at which wood is cut with a good-sized outfit depends almost entirely on the speed with which the wood is brought up to the saw, and the skill of the sawyer and his helper in pushing the logs and poles forward into position without unnecessary loss of time. Under average conditions such an outfit as this should cut in the neighborhood of 20 cords into stove lengths of 12 to 16 inches in a 10-hour day, if kept working steadily. With a crew that works together well, and a saw and engine that are in first-class condition, the output can easily be made greater than this.

In cutting cordwood into stove lengths a smaller crew should be able to keep the saw busy. If the wood is piled near the saw, one man ordinarily can keep the saw supplied, and the man who is doing the sawing will not need a helper. Thus three men usually will be a full crew, one to get the wood to the saw, one at the saw, and one to clear it away and pile it up. Having the wood cut into 4-foot lengths and the larger pieces split into sizes that one man can handle saves at least one man's time at the saw. However, as before stated, this saving in itself is not sufficient to warrant having the wood put in this shape before sawing.

In cutting poles or cordwood the saw can be operated with fewer men than this. Two men can operate the outfit in cutting heavy wood and still make much better time than when cutting by hand, and if a man is cutting wood for himself alone, and has only one man to help him, it may be more economical to do it with the two men than to hire extra hands. The saw will have to be idle while the logs and poles are being brought up to the table and while the cut blocks are being removed, but two men can probably do half as much as the full crew of four. The two men should be able to cut the whole year's supply of wood for the farm in two or three days, and if they can do this without neglecting other work, it may be more economical than hiring extra men. Similarly, two men, or even one, can operate the saw in cutting cordwood into stove lengths. However, if a full crew can be got together by exchanging labor with neighbors, the work can be done more quickly and easily and with less cost for fuel for the engine.

THE DRAG-SAW.

The drag-saw for cutting firewood is not in as common use as the circular saw, but many men use it and for cutting large logs find it preferable to the circular saw. It is most efficient in cutting larger logs and can scarcely compete with the circular saw on wood less than 10 or 12 inches in diameter. A drag-saw is a somewhat more complicated machine than a circular saw, costs from two to three times as much, and does not cut as fast as a circular saw. Its operation is simple, however. It does not require a great deal of power, and while it will not saw through a log or pole as quickly as a buzz saw, the manual labor connected with its use is considerably less for the same class of work, and it can be operated efficiently with a smaller crew.

The carrier of the drag-saw can rest directly on the ground, and the work of rolling the logs on to it is not so great as that required for getting them on to the table of a circular-saw machine. After the log is on the carrier it is not usually necessary to use any more hand labor in connection with the sawing. Most of the drag-saws have power feeding devices, and by simply pushing a lever the car-

riage with the log on it moves up into position for the successive cuts. When a gas engine is used the saw operator has nothing to do but manipulate the levers and raise and lower the saw. Three men, including the saw operator, make a full crew, and they will usually be able to split the blocks into stove-wood size in addition to keeping the uncut logs up to the saw. One man can run a drag-saw by himself and cut a goodly amount of wood in a day. He will have to stop the saw while he is getting the logs on to the carriage and clearing away the cut blocks. If the logs are large it will be hard work, but if only the one man is available he can do several times as much with a drag-saw as he could do by hand.

FIG. 5.—A one-man drag saw outfit, cutting into firewood a log which it would be impossible to handle with any other kind of power machinery.

Portable drag-saw outfits are designed especially to enable one man to cut logs which are too heavy for him to roll and skid. The engine and saw are mounted on the same frame. The log remains stationary on the ground and the sawing outfit is moved along to the places for the successive cuts. (See fig. 5.) Work with a saw of this kind is slower than with one where the logs are placed on a movable carriage, but it enables one man to work alone, whereas several men would be required if the saw were stationary and the logs had to be moved.

Even when running the ordinary drag-saw with a full crew, it will not be possible ordinarily to cut wood as fast as with a circular

saw. The actual cutting is not done so fast and the time taken to move the log up into position for a new cut will usually be somewhat greater than with the circular saw. However, the work is much easier, and two or three men can do at least as much in cutting heavy logs a foot or more in diameter with a drag-saw as they can with a circular saw.

Before the advent of the gasoline engine many farmers cut their wood with a drag-saw driven by horsepower, and this method is still used to some extent. One horse in a treadmill or on a sweep can run the saw if given occasional rests. When only one man is working, the stops due to getting the logs up to the carriage and clearing away the cut blocks will usually give the horse sufficient rest.

For a man who cuts a large amount of wood that is not put into cordwood shape by hand, a drag-saw for the larger logs and a circular saw for the tops and smaller poles make a very efficient combination. The same engine can be used for both saws, a smaller crew can be used than with the buzz saw alone, and not so much hand work in getting the wood ready for the saw will be necessary. The logs to be cut with the drag-saw do not have to be lifted off the ground and handled as much as if they were to be cut with a circular saw, and consequently can be left in longer lengths in preparing them for sawing. Not more than three men should be necessary for the drag-saw when cutting the largest and longest logs, and the same crew can handle easily the smaller poles and tops that are cut with the circular saw.

COST OF OPERATING.

At present prices the first cost of a fully equipped circular sawing machine, including saw blade, is from $25 to over $50, depending upon the size of the saw blade, the construction of the table, frame, etc. The drag-saw is a more complicated machine, and one fully equipped with power feed and blade costs at least $100.

The number of years' service which either of these machines will give will be determined by the care which it receives and the amount of work it does. Ordinarily it will be used a relatively small number of days each year, and since it is a comparatively simple machine the life, aside from the saw blade, will depend largely on the care which is given it. The estimates of about 25 experienced operators show the average life of either a circular- or drag-saw machine is from 15 to 20 years when used for sawing the family supply of wood each year, and possibly loaned to a neighbor or used on a small amount of custom work.

The average amount sawed by these machines was about 30 cords annually, with a range of from about 10 to over 100. The saw blade itself is subject to greater wear than the other parts of the

machine, and unless it receives the best of care it can not be expected to last so long.

The cost of upkeep and repairs, aside from the blade, should be very low. In fact most men say they are at no expense for repairs to the saw frame and table, as they make any needed repairs themselves at odd times. The saw blade will need filing and setting often, but the operator should be able to do that himself. It will need gumming occasionally, and unless he has had some experience in this work and has the proper tools, it will usually pay to have this done at the factory or machine shop. The cost will depend on the size and condition of the saw, but should rarely be over $2. An average of $1 per year will usually cover the outlay for upkeep and repairs both to the saw frame and the blade.

For a sawing machine with an initial cost of $50, lasting 15 years and sawing 30 cords per year, and having $1 per year spent on it for upkeep and repairs, the charge against each cord for depreciation, interest, and repairs, would be approximately as follows:

Annual depreciation one-fifteenth of $50	$3.33
Interest (6 per cent on average value, $25)	1.50
Repairs	1.00
Total annual cost	5.83
Cost per cord	.19

On the basis of 5 gallons of gasoline for running the engine for 10 hours and cutting 20 cords in that time, about a quart of fuel per cord is required. This will necessarily vary, however, with the size of the engine used and the rate at which the wood is cut. With a very efficient engine and the crew working steadily, it might be reduced 50 per cent, easily, and with a large engine and a crew that could not keep the saw fully supplied with wood, the fuel consumption might easily increase 100 per cent. At present prices (1918) the cost of a quart of gasoline is about 6 cents. This makes the total cost exclusive of the engine approximately 25 cents per cord.

If the engine is already on the farm and is used principally for other work, the farmer may prefer to ignore any engine charge for cutting wood. If, on the other hand, the engine is used only for cutting wood and the entire cost is charged against this operation, a large amount will have to be cut each year to make the investment profitable. At present an engine for this work costs from $200 to $500. With a cost of $300, and a life of 15 years, the annual charge for depreciation on the engine will be $20, and for interest (6 per cent of $150) about $9, making $29 per year, or approximately $1 per cord for these two items alone, if the engine is used only for cutting 30 cords of woods annually. Thus it will not be profitable for a farmer to purchase an engine for use only in cutting his own wood.

However, if several farmers can combine in the purchase and use of a complete wood-sawing outfit, including the engine, the original cost to each one will not be so great and the cost per cord cut will be reduced to the point where the outfit will pay for itself in a few years at the most. With a sawing outfit, as with other farm implements, the more work it does the less will be the machinery cost to be charged against each cord cut. A further advantage of cooperation in the ownership of an outfit is that the owners usually find it possible to cooperate in the actual work of cutting the wood, and by exchanging work succeed in getting all the wood cut with little or no cash outlay for hired help.

Where the cooperative plan is not feasible, many farmers prefer to have their wood cut with a hired outfit rather than to purchase an individual rig. The machines are sometimes hired by the day or hour and sometimes by the cord. In cutting poles or heavy wood that has not been put into cordwood, the outfit is usually hired on a time basis. When the saw owner furnishes the fuel for the engine and his own time, $1 or less per hour is usually charged in the eastern part of the country. If the saw is kept busy wood can be cut at the rate of at least two cords per hour. Thus the use of a hired machine for cutting wood will cost the farmer less than 50 cents per cord. In cutting cordwood the outfit is often hired at a fixed rate per cord. Where the saw owner furnishes the fuel and only his own time, the price is usually 35 to 50 cents per cord. If a custom rig has a great deal of sawing to do every year the charges for depreciation, interest, and probable repairs will be considerably less per cord than on the individual outfit. Consequently, the custom outfit can do the work at a price equal to or below the cost of doing it with an individual outfit and still return a profit to the owner.

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